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Road vehicles — Media Oriented Systems Transport (MOST) —

Part 12: 50-Mbit/s balanced media physical layer

Véhicules routiers — Système de transport axé sur les médias — Partie 12: Couche physique de support équilibré à 50-Mbit/s

PROOF/ÉPREUVE

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Foreword

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This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

A list of all parts in the ISO 21806 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The Media Oriented Systems Transport (MOST) communication technology was initially developed at the end of the 1990s in order to support complex audio applications in cars. The MOST Cooperation was founded in 1998 with the goal to develop and enable the technology for the automotive industry. Today, MOST[1)] enables the transport of high Quality of Service (QoS) audio and video together with packet data and real-time control to support modern automotive multimedia and similar applications. MOST is a function-oriented communication technology to network a variety of multimedia devices comprising one or more MOST nodes.

Figure 1 shows a MOST network example.

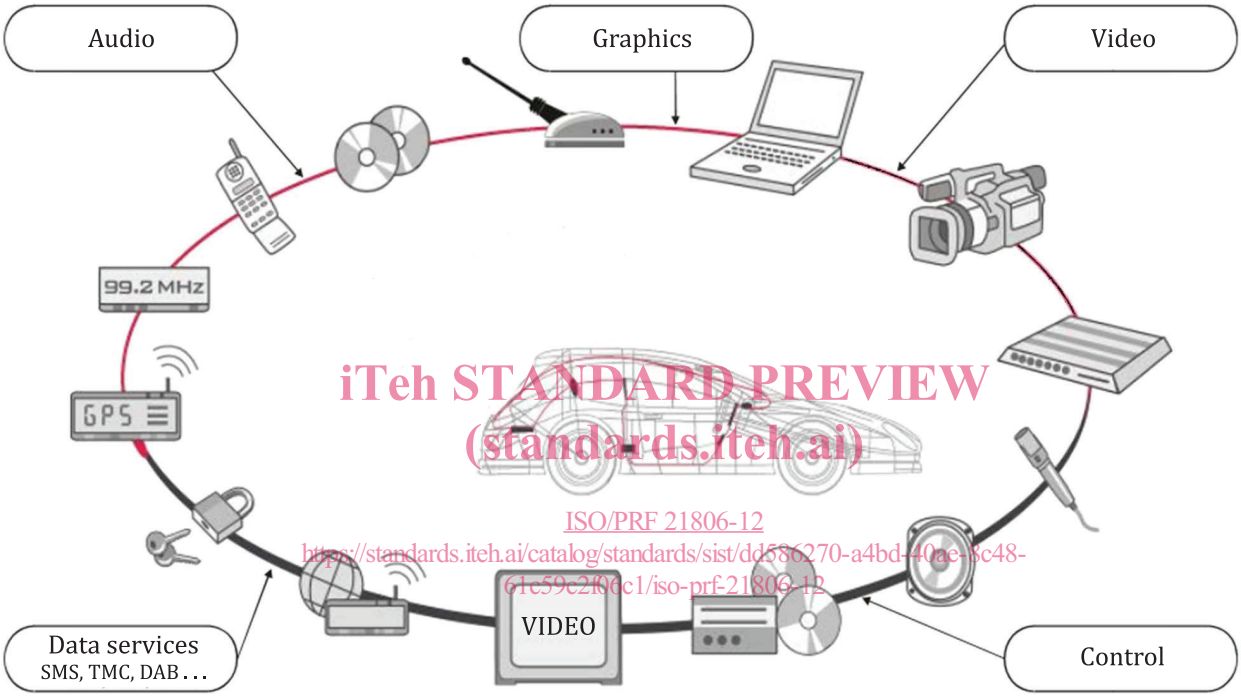

Figure 1 — MOST network example

The MOST communication technology provides:

— synchronous and isochronous streaming,

— small overhead for administrative communication control,

— a functional and hierarchical system model,

— API standardization through a function block (FBlock) framework,

— free partitioning of functionality to real devices,

— service discovery and notification, and

— flexibly scalable automotive-ready Ethernet communication according to ISO/IEC/IEEE 8802-3[2].

MOST is a synchronous time-division-multiplexing (TDM) network that transports different data types on separate channels at low latency. MOST supports different bit rates and physical layers. The network clock is provided with a continuous data signal.

1) MOST® is the registered trademark of Microchip Technology Inc. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO.

Within the synchronous base data signal, the content of multiple streaming connections and control data is transported. For streaming data connections, bandwidth is reserved to avoid interruptions, collisions, or delays in the transport of the data stream.

MOST specifies mechanisms for sending anisochronous, packet-based data in addition to control data and streaming data. The transmission of packet-based data is separated from the transmission of control data and streaming data. None of them interfere with each other.

A MOST network consists of devices that are connected to one common control channel and packet channel.

In summary, MOST is a network that has mechanisms to transport the various signals and data streams that occur in multimedia and infotainment systems.

The ISO standards maintenance portal (https://standards.iso.org/iso/) provides references to MOST specifications implemented in today's road vehicles because easy access via hyperlinks to these specifications is necessary. It references documents that are normative or informative for the MOST versions 4V0, 3V1, 3V0, and 2V5.

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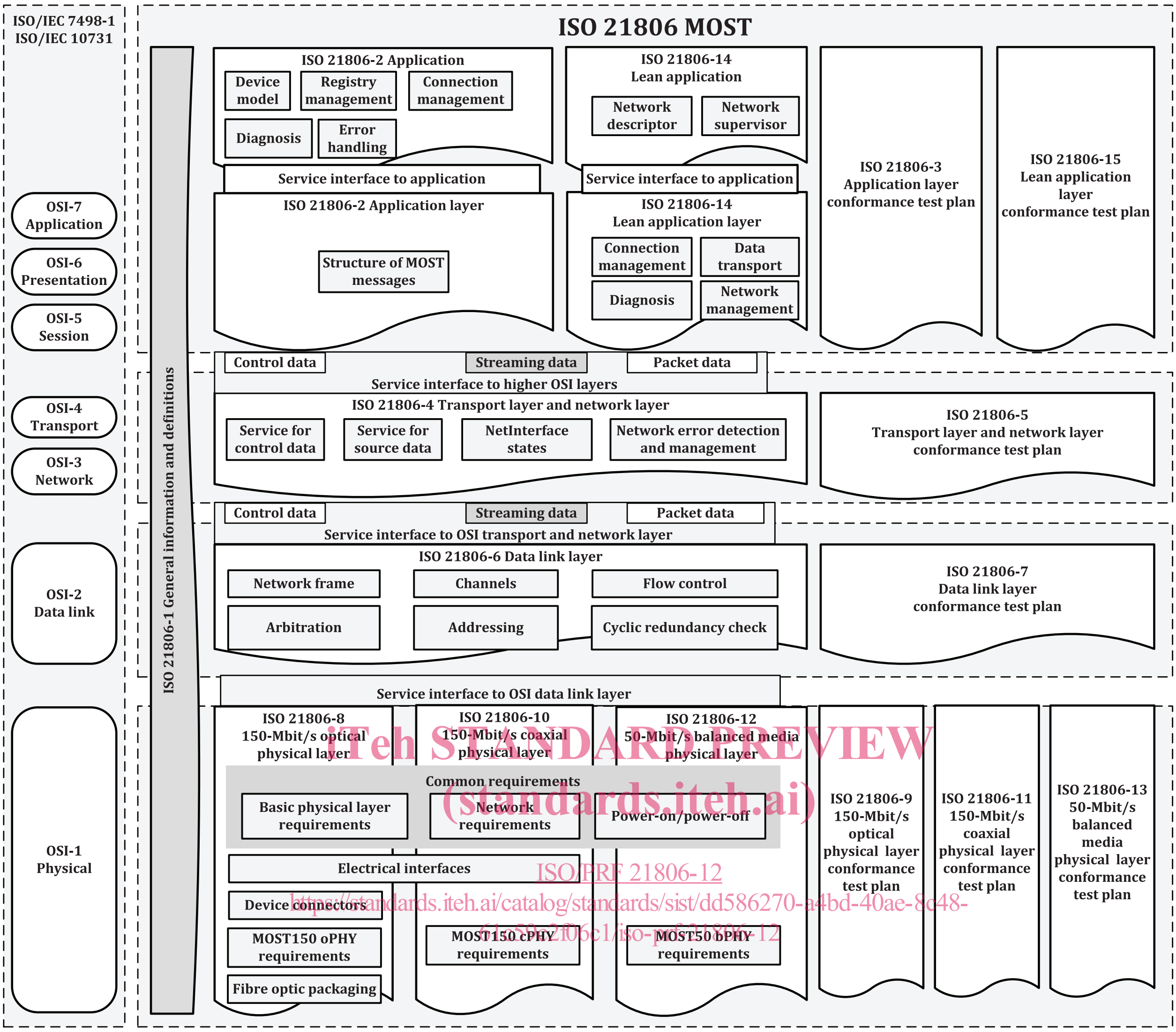
The ISO 21806 series has been established in order to specify requirements and recommendations for implementing the MOST communication technology into multimedia devices and to provide conformance test plans for implementing related test tools and test procedures.

To achieve this, the ISO 21806 series is based on the open systems interconnection (OSI) basic reference model in accordance with ISO/IEC 7498-1[1] and ISO/IEC 10731,[3] which structures communication systems into seven layers as shown in Figure 2. Stream transmission applications use a direct stream data interface (transparent) to the data link layer.


ISO/IEC 7498-1
ISO/IEC 10731
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ISO 21806-7 Data link layer conformance test plan
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ISO 21806-8 150-Mbit/s optical physical layer
ISO 21806-10 150-Mbit/s coaxial physical layer
ISO 21806-12 50-Mbit/s balanced media physical layer
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MOST50 bPHY requirements
ISO 21806-9 150-Mbit/s optical physical layer conformance test plan
ISO 21806-11 150-Mbit/s coaxial physical layer conformance test plan
ISO 21806-13 50-Mbit/s balanced media physical layer conformance test plan

Figure 2 — The ISO 21806 series reference according to the OSI model

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Road vehicles — Media Oriented Systems Transport (MOST) —

Part 12: 50-Mbit/s balanced media physical layer

1 Scope

This document specifies the 50-Mbit/s balanced media physical layer for MOST (MOST50 bPHY), a synchronous time-division-multiplexing network.

This document specifies the applicable constraints and defines interfaces and parameters, suitable for the development of products based on MOST50 bPHY. Such products include electrical interconnects, integrated receivers, transmitters, electrical to balanced media converters, and balanced media to electrical converters.

This document also establishes basic measurement techniques and actual parameter values for MOST50 bPHY.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 21806-1, *Road vehicles — Media Oriented Systems Transport (MOST) — Part 1: General information and definitions*

JEDEC No. JESD8C.01,[2)] *Interface Standard for Nominal 3 V/3,3 V Supply Digital Integrated Circuits*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21806-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
balanced media
BM
unshielded or shielded twisted pair cable

3.2
BEC
balanced media to electrical converter
MOST component that converts a *balanced media* (3.1) signal into an electrical signal

2) Available at https://www.jedec.org/.

3.3
EBC
electrical to balanced media converter
MOST component that converts an electrical signal into a *balanced media* (3.1) signal

4 Symbols and abbreviated terms

4.1 Symbols

---	empty table cell or feature undefined
J_{tr}	transferred jitter
N_{BPF}	number of bits per frame
ρ_{Fs}	network frame rate
σ	standard deviation
t_{MDT}	TimingMaster delay tolerance
t_{UI}	unit interval
ρ_{BR}	bit rate
T_A	ambient temperature
V_{OH}	output high voltage
V_{OL}	output low voltage

4.2 Abbreviated terms

AC	alternating current
AFE	analogue frontend
BEC	balanced media to electrical converter
BM	balanced media
BPF	bits per frame
bPHY	balanced media physical layer
BR	bit rate
BTR	balanced media transceiver
DC	direct current
DCA	DC adaptive
DDJ	data-dependant jitter
DLL	data link layer
DSV	digital sum value

EBC	electrical to balanced media converter
ECU	electronic control unit
EMC	electromagnetic compatibility
EMI	electromagnetic interference
MNC	MOST network controller
PCB	printed circuit board
PDF	probability density function
PHY	physical layer
PLL	phase locked loop
PSD	power spectrum density
RBW	resolution bandwidth
RL	return loss
RMS	root mean square
Rx data	encoded digital bit stream being received
SP[n]	specification point
Tx data	encoded digital bit stream being transmitted
UI	unit interval

5 Conventions

This document is based on OSI service conventions as specified in ISO/IEC 10731[3].

6 Physical layer service interface to OSI data link layer

6.1 Overview

The physical layer (PHY) service interface specifies the abstract interface to the OSI data link layer (DLL), see ISO 21806-6[4].

6.2 Data type definitions

The data type `Enum` is defined as an 8-bit enumeration.

6.3 Event indications and action requests

6.3.1 P_EVENT.INDICATE

The PHY shall use `P_EVENT.INDICATE` to indicate the occurrence of an event to the DLL.

```
P_EVENT.INDICATE{
    PHY_Event
}
```

6.3.2 P_ACTION.REQUEST

`P_ACTION.REQUEST` shall trigger the execution of a request.

```
P_ACTION.REQUEST {
    PHY_Request
}
```

6.4 Parameters

6.4.1 PHY_Event

Table 1 specifies the `PHY_Event` parameter, which notifies the DLL about events.

Table 1 — Parameter passed from PHY to DLL

Parameter	Data type	Description

`PHY_Event`	`Enum {`
	`PHY_Output_Off,`
	`PHY_Network_Activity`
	`}`
		An event that is reported to the DLL.

Table 2 specifies the parameter values for the `PHY_Event Enum`.

Table 2 — PHY_Event Enum values

Enum value	Description
`PHY_Output_Off`	MNC transmit terminal is switched off.
`PHY_Network_Activity`	Network activity is detected at the MNC receive terminal.

6.4.2 PHY_Request

Table 3 specifies the `PHY_Request` parameter, which is passed from DLL to PHY.

Table 3 — Parameter passed from DLL to PHY

Parameter	Data type	Description

`PHY_Request`	`Enum {`
	`cmd_Output_Off,`
	`cmd_Output_On,`
	`cmd_Open_Bypass,`
	`}`
		A request from the DLL

Table 4 specifies the parameter values for the `PHY_Request Enum`.

Table 4 — PHY_Request Enum values

Enum value	Description
`cmd_Output_Off`	Switching off the MNC transmit terminal is requested. By default, it is off.
`cmd_Output_On`	Switching on the MNC transmit terminal is requested. By default, it is off.
`cmd_Open_Bypass`	Opening the bypass is requested. By default, the bypass is closed.

7 Basic physical layer requirements

7.1 Logic terminology

7.1.1 Single-ended low-voltage digital signals

For the parameters provided in JEDEC No. JESD8C.01, Table 5 defines the corresponding terms for single-ended signals used in this document. These terms are used to describe the logic states of signals /RST and STATUS.

Table 5 — Terms for single-ended signals

Term	Corresponding JEDEC parameter
Low	V_{OL} (output low voltage)
Logic 0	
High	V_{OH} (output high voltage)
Logic 1	

7.1.2 Differential signals

Table 6 explains the expressions used to describe the logic states of the differential data signals.

Table 6 — Differential signals

Expression	Description
Disabled	The P and N terminals are in a high impedance state. Small leakage currents may exist which can cause an indeterminate voltage on the line/load.
Off	
Enabled	Both the P and N terminals are driving the line / load. The outputs may be in a transitioning phase or in the process to settle differential amplitude as well as common mode. The defined link quality parameter requirements may not be met.
On	
Valid MOST data	DCA encoded data that meets defined link quality parameters and bit rate requirements.

7.2 SPs

A physical connection of two MOST devices is called a link. Measurements are taken at specific locations along a link. These locations are called SPs. The location of the SPs is shown in Figure 3.